

EFFECT OF NICOTINE ON RED CELL DEFORMIBILITY IN DIABETES MELLITUS

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The property of deformibility of the red cells is very important in the maintenance of microcirculation. It was well established that in diabetes mellitus the red cell deformibility was reduced. In this study we investigated the effect of nicotine (10^{-5} M- 10^{-2} M) on erythrocyte deformibility in non-insulin-dependent diabetes mellitus.

Blood samples obtained from 15 healthy volunteers (fasting blood glucose: 85 ± 7) were used as control and 28 diabetic patients (fasting blood glucose: 265 ± 46 , with mean \pm SD duration of diabetes 6 ± 2 years) were used as experimental groups. Erythrocyte deformibility was assessed in terms of erythrocyte filtration time and erythrocyte filtration time was measured by microfiltration technique.

The mean \pm SD duration of filtration time in control group was 6.2 ± 1.2 sec in diabetic group was 8.4 ± 1.5 sec.

Nicotine was added to the solutions of 20% red cell suspension to yield final concentrations of 10^{-5} M, 10^{-4} M, 10^{-3} M and 10^{-2} M and the measurements of filtration times were made 0.5 min., 1 min., 2 min., 3 min., 5 min. and 10 min. after addition of nicotine.

Our results showed that the mode of action of nicotine both on control and diabetic groups is time-dependent and the intensity of its action is concentration-dependent. Initially it caused a decrease in filtration rate which lasted 2-3 min at lower concentrations (10^{-5} - 10^{-4} M), 3-4 min at higher concentrations (10^{-3} - 10^{-2} M). At lower concentrations the decrease in filtration rate was 16% and 22% in control and diabetic groups respectively. At higher concentrations these values turned out to be 21% and 29% in control and diabetic groups. The initial fall in deformibility was transient and it was followed by significant enhancements. At the 5th min. the durations of filtration were 10% and 18% shorter than their pre-nicotine values in control and diabetic groups respectively. At the 10th min measurements more or less the same values as at the 5th min were obtained.

Conclusion: Nicotine alters the deformibilities of both healthy and diabetic red blood cells in a time- and concentration-dependent manner, but the effect on diabetic cells is more pronounced.

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